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EXAMINER

DOVE, TRACY MAE

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1745

DATE MAILED: 06/12/2003

27

Please find below and/or attached an Office communication concerning this application or proceeding.

1522

# Office Action Summary

Application No.

09/381,295

Applicant(s)

AIHARA ET AL.

Examiner

Tracy Dove

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-14,17 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8 is/are allowed.
- 6) ☒ Claim(s) 1-3,5-7,9-14,17 and 19-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

This Office Action is in response to the communication filed on 4/18/03. Applicant's arguments have been considered, but are moot in view of the new grounds of rejection. Claims 1-3, 5-14, 17 and 19-21 are pending. Claim 8 has been allowed.

#### ***Claim Objections***

Claims 1, 20 and 21 are objected to because of the following informalities: the claims recite "polyvinylidene fluoride". The claims should be amended to recite "polyvinylidene fluoride" (see Example 1 of specification). Appropriate correction is required.

#### ***Claims Analysis***

The claims recite an adhesive resin of "polyvinylidene fluoride", which is interpreted as a fluorocarbon resin containing a polyvinylidene fluoride structure. See specification page 14, 2<sup>nd</sup> paragraph. Furthermore, "polyvinyl alcohol" is interpreted as a polymer containing polyvinyl alcohol in the molecular structure. See specification page 14, 2<sup>nd</sup> paragraph. The specification describes both "polyvinylidene fluoride" and "polyvinyl alcohol" as generic terms describing polymers containing a polyvinylidene fluoride structure or a polyvinyl alcohol structure, respectively.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 5-7, 9, 14, 17 and 19-21 are rejected under 35 U.S.C. 102(e)/103(a) as being anticipated by, and alternatively unpatentable over, Delnick, US 5,948,464 as evidenced by Takeuchi et al., US 6,096,456.

Delnick teaches a method of forming a porous composite separator layer for an electrochemical cell. A separator precursor solution is applied to one of the cell electrodes. The precursor solution comprises a filler material dispersed in a solution of a polymer binder which is dissolved in a suitable solvent. The process allows the manufacture of thin and flexible composite separators which are conformally bonded to the underlying electrodes (see abstract). Figure 1 shows a cell 10 comprising a negative electrode 19 having a collector 20 and active material layer 15, a positive electrode 29 having a collector 30 and an active material layer 16, and a separator (adhesive resin layer) 25. A liquid electrolyte (electrolytic solution) is contained within the pores of the porous separator material so that the electrolyte provides a conducting medium between the first and second electrode layers (col. 5, lines 1-7). The filler material is a solid particulate material such as alumina, silica or magnesia having a particulate size in the range of from about 0.01  $\mu\text{m}$  to about 1.0  $\mu\text{m}$  (col. 6, lines 45-67). The polymeric binder may

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consist of a single polymer, a mixture of polymers or a mixture of polymers and copolymers. Typical binders include polyvinyl chloride (PVC), polyvinylidene fluoride-hexafluoropropylene copolymer (PVDF) and ethylene propylene hexadiene monomer (EPDM). The ratio of polymer binder to solid particulate material ranges from about 5/95 to 35/65 (see col. 7, lines 5-27). The separator has a thickness of 5-100  $\mu\text{m}$  and is directly adjoined to the electrode so that the electrode imparts the strength needed to support the separator (col. 9, lines 15-37). An electrolyte comprising propylene carbonate and  $\text{LiClO}_4$  was dispersed into the separator (example 1). Example 2 of Delnick discloses the separator precursor contains 30 parts PVDF binder to 70 parts of alumina.

Delnick is silent regarding an uneven electrode surface or a peel strength in a range of from 50 gf/cm to 85 gf/cm. However, one having ordinary skill in the art would have known that the surfaces of the electrodes are inherently uneven. This is evidenced by Takeuchi which teaches the electrodes have holes, or are uneven (col. 25, lines 17-29). The background section of the instant specification teaches that electrodes have their surfaces smoothed by pressing but still have unevenness of several microns to form vacancies where a conventional separator and the electrodes are not in contact (bottom of page 3-top of page 4). Thus, the skilled artisan would have known that electrodes inherently have an uneven surface.

Note that since the materials of the inventive separator of Delnick (Example 2 teaches alumina and PVDF) and those of the instant invention (all the Examples in Table 2-4 teach alumina and PVDF) are the same, the separator material of Delnick will also fill any space in an uneven electrode surface. Furthermore, Delnick teaches the composite separator is conformally bonded to the electrode plate (col. 8, lines 46-48). Similarly, one of skill would expect the

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inventive separator of Delnick to have a peel strength equivalent to that of the instant claims. Specifically, Delnick teaches the same ratios of adhesive resin to filler material. Thus, one of skill in the art would have known that the peel strength between the separator(adhesive layer) and electrodes of Delnick would inherently be the same as the peel strength between the adhesive layer and electrodes of the claimed invention. Furthermore, Delnick teaches the interface between the separator and electrode is less likely to delaminate (peel) due to thermal or electrochemical expansion or contraction during operation of the cell (col. 9, lines 7-10).

Regarding claims 5 and 6, Examples 1 and 2 of Delnick teach the solvent content of the separator precursor (ink) ranges from 60-75% (col. 10, lines 16-17). Then the precursor was applied to the electrode and the solvent was removed to create the pores of the separator. Thus, the pore void volume of the separator is 60-75% and the polymer/resin volume is 25-40% of the separator.

Note both the PVDF of Delnick (col. 10, line 4) and the PVDF of the instant invention (page 16, line 20) were obtained from Elf Atochem.

Thus the claims are anticipated or, alternatively, obvious.

The MPEP states the express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. "The inherent teaching of a prior art reference, a question of fact, arises both in the context of anticipation and obviousness." In re Napier, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995). Something which is old does not become patentable upon the discovery of a new property. The claiming of a new use, new function or unknown property which is inherently present in the prior art does not necessarily make the claim patentable. In re Best, 562 F.2d 1252, 1254, 195 USPQ

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430, 433 (CCPA 1977). A rejection under 35 U.S.C. 102/103 can be made when the prior art product seems to be identical except that the prior art is silent as to an inherent characteristic. Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection. "There is nothing inconsistent in concurrent rejections for obviousness under 35 U.S.C. 103 and for anticipation under 35 U.S.C. 102." In re Best, 562 F.2d 1252, 1255 n.4, 195 USPQ 430, 433 n.4 (CCPA 1977). Therefore, a 35 U.S.C. 102/103 rejection is appropriate for the claimed invention.

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Claims 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Delnick, US 5,948,464 (as evidenced by Takeuchi et al., US 6,096,456) in view of Yamashita et al., US 6,287,720.

See discussion of Delnick above.

Delnick is silent regarding a plurality of laminates of a plurality of positive electrodes, negative electrodes and adhesive resin layers that may be either spirally wound (rolled up) or folded.

However, Yamashita teaches a battery comprising a positive electrode, a negative electrode and a sole porous separator (adhesive layer) disposed between the positive electrode and the negative electrode. The three layer structure is disposed in a casing containing an electrolyte. The porous separator includes at least one insulating substance (filler). See abstract. Example 2 teaches a separator having insulating particles of alumina with an average particle

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diameter of 1.0  $\mu\text{m}$  and a PVDF binder. The particles of alumina and particles of PVDF were mixed with each other to obtain a powder mixture. Then solvent was added to the mixture to obtain a slurry. The slurry may be applied to either or both electrodes and dried to obtain the separator. See col. 22, lines 1-36. The cell of Yamashita can be used in the form of a spirally wound structure in which the unit cell is spirally wound so that the negative electrode of the wound unit cell is positioned on the side of the outer surface of each wind of the spirally wound structure, or in the form of a laminate structure in which a plurality of the unit cells are laminated so that each positive electrode is positioned opposite to a negative electrode through a separator. See col. 13, line 58-col. 14, line 9. The alumina may have a particle size of 5 nm (0.005  $\mu\text{m}$ ) to 1  $\mu\text{m}$ , most preferably (col. 7, lines 47-51).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have known that the electrochemical cell of Delnick could be used in the form of a plurality of unit cells laminated or wound together. It is well known in the art to provide a battery comprising a plurality of unit cells. This is shown by Yamashita which teaches a similar unit cell to that of Delnick. Thus, one of skill in the art would have been motivated to form a battery comprising a plurality of laminated unit cells as disclosed by Delnick in view of the teachings of the prior art.

***Allowable Subject Matter***

Claim 8 has been allowed.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is (703) 308-8821. The



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Examiner may normally be reached Monday-Thursday (9:00 AM-7:30 PM). My supervisor is Pat Ryan, who can be reached at (703) 308-2383. The Art Unit receptionist can be reached at (703) 308-0661 and the official fax numbers are 703-872-9310 (after non-final) and 703-872-9311 (after final).

June 5, 2003

  
**Patrick Ryan**  
**Supervisory Patent Examiner**  
**Technology Center 1700**